

21st RD50 Workshop (CERN)

Report of Contributions

Contribution ID: 0

Type: **not specified**

Simulation of irradiated silicon p-bulk sensors

Thursday, November 15, 2012 12:10 PM (20 minutes)

TCAD simulations of irradiated silicon p-bulk sensors have been carried out and the results have been compared to CERN 24 GeV-p irradiated n-in-p diodes.

The simulations' results are in good agreement with measured data and allow for reliable predictions on future detectors.

Primary author: BOMBEN, Marco (Univ. P. et Marie Curie (Paris VI) (FR))

Co-author: MARCHIORI, Giovanni (Univ. P. et Marie Curie (Paris VI) (FR))

Presenter: BOMBEN, Marco (Univ. P. et Marie Curie (Paris VI) (FR))

Session Classification: Detector Characterization and Simulations

Track Classification: RD50/PPS session (Friday morning)

Contribution ID: 1

Type: **not specified**

The Birmingham Irradiation Facility

Friday, November 16, 2012 11:50 AM (20 minutes)

At the end of 2012 the proton irradiation facility at the CERN PS will shut down for two years. With this in mind a new irradiation facility has been setup at Birmingham University. This uses a newly built high intensity area of a 26MeV proton cyclotron in the medical physics department. The facility can be used to irradiate silicon sensors, optical components and mechanical structures (e.g . carbon fiber sandwiches) for the LHC upgrade program. Irradiations of silicon sensors can be carried out, in a temperature controlled cold box that can be scanned through the beam. The facility is described in detail, along with the first tests carried out with mini (1 by 1 cm²) silicon sensors.

Primary author: DERVAN, Paul (University of Liverpool (GB))

Co-authors: CASSE, Gianluigi (University of Liverpool (GB)); Mr MARIN-REYES, Hector (University of Sheffield); Dr WILSON, John Allan (University of Birmingham (GB)); HODGSON, Paul (University of Sheffield (GB)); FRENCH, Richard (The University of Sheffield)

Presenter: FRENCH, Richard (The University of Sheffield)

Session Classification: Irradiation Facilities, 3D and Pixel Detectors (joined with ATLAS PPS)

Track Classification: Full Detector Systems

Contribution ID: 2

Type: **not specified**

Electronic properties of vacancy aggregates in n-type silicon for particle detectors

Wednesday, November 14, 2012 2:00 PM (20 minutes)

Vacancy aggregates, formed in silicon exposed to high fluences of hadrons or ions, seem to be the main defects limiting radiation hardness of tracking detectors. Recently, the electronic properties of these defects have been intensively studied using theoretical calculations. However, apart from the case of divacancies, very few experimental results concerning the properties higher order vacancy complexes have been obtained. In this paper, we report the new results obtained by the high-resolution photoinduced transient spectroscopy (HRPITS) indicating the presence of trivacancies (V_3) both in neutron-irradiated n-type MCz Si and proton irradiated epitaxial silicon. Based on the Laplace spectral fringes, the activation energies for electron emission from deep acceptors $V_3(2-/)$ and $V_3(-/0)$, equal to 0.36 and 0.46 eV, respectively, were determined. The activation energies for electron emission from tetravacancy related deep acceptors $V_4(2-/)$ and $V_4(-/0)$, are likely to be 0.39 and 0.55 eV, respectively.

Primary author: Prof. KAMINSKI, Pawel (Institute of Electronic Materials Technology)

Co-authors: Dr KOZLOWSKI, Roman (Institute of Electronic Materials Technology); Mr JAROSLAW, Zelazko (Institute of Electronic Materials Technology)

Presenter: Prof. KAMINSKI, Pawel (Institute of Electronic Materials Technology)

Session Classification: Defect and Material Characterization

Track Classification: Microscopic Defects and Material Characterization

Contribution ID: 3

Type: **not specified**

Irradiation study on diodes of different silicon materials for the CMS tracker upgrade

Thursday, November 15, 2012 9:00 AM (15 minutes)

The aim of the CMS tracker upgrade campaign is to find a new radiation hard sensor material for the HL-LHC upgrade of the CMS tracker. Different test structures and sensors were implemented on a variety of silicon materials with different thicknesses by Hamatsu Photonics, Japan. Samples have been irradiated to fluences up to $1.5E15$ with protons at Karlsruhe and the CERN PS and with reactor neutrons at Ljubljana.

To find a radiation hard sensor material we investigated current characteristics (I-V), capacitance characteristics (C-V) and characteristics of charge collection (TCT).

This talk will present the results concerning dark current, effective doping concentration and charge collection efficiency and their annealing, key parameters in defining a material well suited for the upgrade of the CMS tracker.

Primary author: ERFLE, Joachim (Hamburg University (DE))

Presenter: ERFLE, Joachim (Hamburg University (DE))

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: 4

Type: **not specified**

Radiation damage in n-type silicon after electron irradiation with energies between 1.5 MeV and 15 MeV

Wednesday, November 14, 2012 2:20 PM (20 minutes)

The study of the radiation damage by electrons of different energies allows investigating separately point and cluster defects: 1 MeV electrons produce only point defects, whereas at 15 MeV cluster defects dominate.

For these studies pad diodes fabricated on high resistivity n-type Standard Float Zone (STFZ), Diffusion Oxygenated Float Zone (DOFZ) and thin epitaxial layers grown on Czochralski substrate (EPI) were used. The electrical properties of the diodes have been characterized by capacitance- and current-voltage (CV/IV) measurements. For the characterization of the radiation induced defects the Thermally Stimulated Current (TSC) and Deep Level Transient Spectroscopy (DLTS) methods were used. Isothermal annealing at 80 C and isochronal annealing measurements were performed allowing the study of defect kinetics.

From DLTS measurements the formation of point and cluster defects as function of electron energy will be demonstrated via the concentration ratio of the single vacancy related defect VO, the double vacancy V2 and the tri vacancy defect complex V3.

By TSC measurements the development of cluster related deep hole traps and a shallow donor has been investigated and detailed annealing studies have been performed. These microscopic findings are compared with the development of the macroscopic diode properties.

Primary author: RADU, Roxana (Institute for Experimental Physics, Hamburg University)

Co-authors: FRETWURST, Eckhart (Institute for Experimental Physics, Hamburg University); LINDSTRÖM, Gunnar (Institute for Experimental Physics, Hamburg University); PINTILIE, Ioana (National Institute of Materials Physics NIMP, Bucharest); KLANNER, Robert (Institute for Experimental Physics, Hamburg University)

Presenter: RADU, Roxana (Institute for Experimental Physics, Hamburg University)

Session Classification: Defect and Material Characterization

Track Classification: Microscopic Defects and Material Characterization

Contribution ID: 5

Type: **not specified**

Evolution of pulsed current and of carrier lifetime characteristics in Si structures during 25 MeV neutrons irradiation using a spallator type source

Wednesday, November 14, 2012 3:00 PM (20 minutes)

Evolution of pulsed current and of carrier lifetime characteristics in Si structures during 25 MeV neutrons irradiation using a spallator type source

E.Gaubas¹, T.Ceponis¹, A.Jasiunas¹, A.Uleckas¹, J.Vaitkus¹, E.Cortina², and O.Militaru³

1 - Vilnius University, Institute of Applied Research, Vilnius

2 - Center for Cosmology, Particle Physics and Phenomenology, Universite catholique de Louvain

3 - Cyclotron Research Center, Universite catholique de Louvain, Louvain la Neuve

Evolution of pulsed current and of carrier lifetime characteristics in Si structures measured in situ during neutron irradiation will be discussed. A spallator type source producing neutrons with energy peak at 25 MeV was exploited in these experiments to perform the on-line measurements at room temperature by combining several techniques operating in distant measurement mode. The obtained changes of pulsed currents and of carrier lifetime characteristics well correlate mutually when considered relatively to an increasing neutron fluence value. Thereby, it has been approved that measurements of correlated lifetime changes, performed in contactless and distant manner and calibrated with other parameters, can be a powerful tool for rather precise prediction of detector performance in a wide dynamic range.

Primary author: Dr GAUBAS, Eugenijus (Vilnius University)

Presenter: Dr GAUBAS, Eugenijus (Vilnius University)

Session Classification: Defect and Material Characterization

Contribution ID: 6

Type: **not specified**

A Portable Telescope Based on the Alibava System for Test Beam Studies

Thursday, November 15, 2012 4:00 PM (20 minutes)

A test beam telescope has been built using the ALIBAVA system to drive its data acquisition. The basic telescope planes consist in four XYT stations. Each station is built from a detector board with two 80-micron-pitch sensors, mounted one in each side and their strips crossing at 90 degrees. The ensemble is coupled to an ALIBAVA daughter board. These stations act as reference frame and allow a precise track reconstruction. The system is triggered by the coincidence signal of the two scintillators located up and down stream. The telescope can hold several devices under tests. Those may be mounted on detector boards coupled to the ALIBAVA daughter board. Each ALIBAVA daughter board (either linked to XYT station or a device under test) is subsequently read by its corresponding mother board. The acquisition system can hold up to 16 mother boards. The whole system is controlled by a master board that synchronizes all the mother boards and collects all the data. The off-line analysis software has been developed to study the charge collection, cluster width, tracking efficiency, resolution, etc, of the devices under test. Moreover, the built-in ALIBAVA TDC allows the analysis of the time profile of the device signal.

The ALIBAVA Telescope has been successfully operated in two test runs at the DESY and CERN-SPS beam lines. The complete telescope system will be described and the preliminary results will be presented.

Primary authors: Dr RODRIGUEZ, Joaquin (IMB-CNM Barcelona); LOZANO FANTOBA, Manuel (Universidad de Valencia (ES)); MARTI I GARCIA, Salvador (IFIC-Valencia (UV/EG-CSIC))

Co-authors: GREENALL, Ashley (University of Liverpool (GB)); LACASTA LLACER, Carlos (IFIC-Valencia); Prof. GARCIA, Carmen (IFIC Valencia (ES)); FORSHAW, Dean Charles (University of Liverpool (GB)); CASSE, Gianluigi (University of Liverpool (GB)); PELLEGRINI, Giulio (Universidad de Valencia (ES)); TSURIN, Ilya (University of Liverpool (GB)); BERNABEU VERDU, Jose (Universidad de Valencia (ES)); Dr ULLAN COMES, Miguel (Universidad de Valencia (ES)); LACUESTA MIQUEL, Vicente (IFIC (CSIC - UV))

Presenter: LOZANO FANTOBA, Manuel (Universidad de Valencia (ES))

Session Classification: Full Detector Systems

Track Classification: Full Detector Systems

Contribution ID: 7

Type: **not specified**

Electrical characterisation of heavily irradiated microstrip sensors

Thursday, November 15, 2012 11:50 AM (20 minutes)

Electrical characterisation is made of the n-in-p microstrip sensors irradiated by 1 MeV neutron equivalent fluence up to $1\text{E}+16$ n/cm². It is shown that the interstrip capacitance is not affected by irradiation and the interstrip resistance remains very high up to the maximum investigated fluence.

Primary author: Dr CHILINGAROV, Alexandre (Lancaster University, UK)

Presenter: Dr CHILINGAROV, Alexandre (Lancaster University, UK)

Session Classification: Detector Characterization and Simulations

Track Classification: Full Detector Systems

Contribution ID: 8

Type: **not specified**

Temperature dependence of the bulk current in Si

Thursday, November 15, 2012 10:00 AM (20 minutes)

Experimental results on the temperature dependence of the current generated in Si bulk are presented and compared with expectations.

Primary author: CHILINGAROV, Alexandre (Lancaster University (GB))

Presenter: CHILINGAROV, Alexandre (Lancaster University (GB))

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: 9

Type: **not specified**

Characterization of active edge planar pixels produced at VTT

Friday, November 16, 2012 10:20 AM (20 minutes)

We will report about the characterization of FE-I3 and FE-I4 active edge planar n-in-p pixels produced at VTT, Finland. The sensor thickness is 100 μm and different geometries of the sensor edges have been implemented, down to an inactive width of only 50 μm . The interconnection of the sensors to the ATLAS FE-I3 and FE-I4 chips has been performed at VTT, with solder bump bonding.

In addition to the IV characterization, the results of the measurements with a ^{90}Sr source will be discussed. The charge collection properties of the edge pixels will be compared with those in the center region.

The first analysis of beam test data obtained with these devices before irradiation at CERN-SPS, using the EUDET telescope, will be presented.

Primary author: MACCHIOLO, Anna (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D))

Co-authors: MOSER, Hans-Gunther (Werner-Heisenberg-Institut); ANDRICEK, Laci (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D)); WEIGELL, Philipp (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D)); RICHTER, Rainer (MPI for Physics); Dr NISIUS, Richard (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D)); TERZO, Stefano (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D))

Presenter: MACCHIOLO, Anna (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D))

Session Classification: Irradiation Facilities, 3D and Pixel Detectors (joined with ATLAS PPS)

Track Classification: RD50/PPS session (Friday morning)

Contribution ID: **10**Type: **not specified**

TCT measurements with irradiated strip detectors

Thursday, November 15, 2012 11:30 AM (20 minutes)

TCT measurements with strip detectors will be presented. Focused IR laser light pulses were directed to the surface (top) of the detector and TCT signals were measured at different locations of light impact. Measurements were made with specially designed mini strip detectors in which n-type implants are not fully covered with metal allowing laser TCT measurements also with pulses directed on the implants. Measurements were made with detectors irradiated with neutrons up to 5×10^{15} n/cm² and were repeated after several annealing steps at 60C.

Primary author: MANDIC, Igor (Jozef Stefan Institute (SI))

Co-authors: KRAMBERGER, Gregor (Jozef Stefan Institute (SI)); MIKUZ, Marko (Jozef Stefan Institute (SI)); MILOVANOVIC, Marko (Jozef Stefan Institute, Ljubljana); Dr ZAVRTANIK, Marko (Jozef Stefan Institute (SI)); CINDRO, Vladimir (Jozef Stefan Institute (SI))

Presenter: MANDIC, Igor (Jozef Stefan Institute (SI))

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: 11

Type: **not specified**

Measurements on 800 MeV proton irradiated diodes (moved to Thursday morning!)

Wednesday, November 14, 2012 4:30 PM (20 minutes)

The radiation damage inflicted by protons of different energies leads to differences in the electrical properties of silicon sensors even at similar equivalent fluences. This work aims to understand the impact of radiation damage of protons of different energies. \\

Irradiations in the blue room of the LANSCE facility in Los Alamos with 800 MeV protons have been carried out on a set of Float Zone, Magnetic Czochralski and epitaxially grown Diodes. These materials had been under investigation within the RD50 collaboration before, and results of irradiations with 23 GeV protons from PS at CERN and 1 MeV neutrons in Ljubljana are available for comparison.\\

Within this year Brown University has build up a silicon laboratory for electrical sensor characterization. The recently build capacitance-voltage / current-voltage (CV/IV) setup has been used to characterize the proton irradiated samples. Results of the ongoing measurements are presented.

Primary author: JUNKES, Alexandra (Brown University)

Co-authors: GARABEDIAN, Alex Edward (Brown University (US)); NARAIN, Meenakshi (Brown University (US)); HEINTZ, Ulrich (Brown University (US)); MAO, Zaixing (Brown University (US))

Presenter: JUNKES, Alexandra (Brown University)

Session Classification: Defect and Material Characterization

Track Classification: Microscopic Defects and Material Characterization

Contribution ID: 12

Type: **not specified**

The free carrier transport properties in proton and neutron irradiated Si(Ge)

Wednesday, November 14, 2012 3:20 PM (20 minutes)

The Hall and magnetoresistance were investigated in Si(Ge) initial crystals and irradiated to $1e12$ and $1e13$ protons and neutrons, and by 4-6 MeV electrons to $3.6e16$ cm⁻² at different temperature.

Primary author: Prof. VAITKUS, Juozas (Vilnius University)

Co-authors: Dr MEKYS, Algirdas (Vilnius University); Dr STORASTA, Jurgis (Vilnius University); Dr MAKARENKO, Leonid (Belarusian state University); Mr RUMBAUSKAS, Vytautas (Vilnius University)

Presenter: Prof. VAITKUS, Juozas (Vilnius University)

Session Classification: Defect and Material Characterization

Track Classification: Microscopic Defects and Material Characterization

Contribution ID: 13

Type: **not specified**

Non uniform irradiation of CNM 3D sensors for AFP

Friday, November 16, 2012 9:00 AM (20 minutes)

Pixel detectors with cylindrical electrodes that penetrate the silicon substrate (so called 3D detectors) offer advantages over standard planar sensors in terms of radiation hardness. In the framework of the ATLAS Forward Physics (AFP) program, work has been carried out to study the suitability of 3D pixel devices for forward proton tracking. Minimal dead area and high efficiency after inhomogeneous irradiation are critical requirements the AFP. Recent results of the characterization of slim-edged devices and beam test studies of in-homogeneously irradiated pixel devices carried out by the 3D R&D and AFP ATLAS groups will be presented.

Primary authors: MICELLI, Andrea (IFAE Barcelona); LOPEZ PAZ, Ivan (U); TSISKARIDZE, Shota (Universitat Autònoma de Barcelona (ES))

Presenter: MICELLI, Andrea (IFAE Barcelona)

Session Classification: Irradiation Facilities, 3D and Pixel Detectors (joined with ATLAS PPS)

Track Classification: RD50/PPS session (Friday morning)

Contribution ID: 14

Type: **not specified**

Status of the RD50 funding request for ”detectors with enhanced multiplication”

Thursday, November 15, 2012 5:50 PM (20 minutes)

This project aims to fabricate p-type pixel detectors with a small gain, already shown in their pre-irradiated responses. It can be hoped that the gain implemented in the non-irradiated devices could retain some effect also after irradiation, with a higher multiplication factor with respect to standard structures. In addition, a moderate multiplication value will allow the fabrication of thinner devices with the same output signal. The signal gain should be limited to avoid crosstalk, and to prevent the signal from exceeding the dynamic range of readout electronics.

Primary author: PELLEGRINI, Giulio (Centro Nacional de Microelectrónica (IMB-CNM_CSIC))

Presenter: PELLEGRINI, Giulio (Centro Nacional de Microelectrónica (IMB-CNM_CSIC))

Session Classification: Full Detector Systems

Track Classification: Full Detector Systems

Contribution ID: 15

Type: **not specified**

Charge collection studies on heavily irradiated diodes from the RD50 multiplication run (an update)

Thursday, November 15, 2012 10:20 AM (20 minutes)

Special diodes were designed on RD50 multiplication mask which combine the ease of use of a pad-detector with electric field of a strip detector. A series of charge collection measurements was performed with diodes of different implant properties and thicknesses. The diodes were irradiated with neutrons to the total accumulated fluence of $8 \times 10^{16} \text{ cm}^{-2}$. Charge collection efficiency for ^{90}Sr was measured at each fluence and for selected detectors also during long term annealing. The values were compared between the wafers with different properties as well as with standard pad detectors.

Primary author: KRAMBERGER, Gregor (Jozef Stefan Institute (SI))

Co-authors: MANDIC, Igor (Jozef Stefan Institute (SI)); MIKUZ, Marko (Jozef Stefan Institute (SI)); MILOVANOVIC, Marko (Jozef Stefan Institute, Ljubljana); Dr ZAVRTANIK, Marko (Jozef Stefan Institute (SI)); CINDRO, Vladimir (Jozef Stefan Institute (SI))

Presenter: KRAMBERGER, Gregor (Jozef Stefan Institute (SI))

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: 16

Type: **not specified**

MOS Capacitor Displacement Damage Dose (DDD) Dosimeter

Wednesday, November 14, 2012 4:50 PM (20 minutes)

On the characterization by experiments and simulation of the possibilities of nanometric MOS capacitors for DDD dosimetry.

Primary author: Dr PALOMO PINTO, Fco.Rogelio (University of Sevilla, School of Engineering)

Co-authors: Mr FERNÁNDEZ-MARTÍNEZ, Pablo (Centro Nacional de Microelectrónica Barcelona CSIC); Dr HIDALGO VILLENA, Salvador (Centro Nacional de Microelectrónica Barcelona CSIC)

Presenter: Dr PALOMO PINTO, Fco.Rogelio (University of Sevilla, School of Engineering)

Session Classification: Defect and Material Characterization

Track Classification: Microscopic Defects and Material Characterization

Contribution ID: 17

Type: **not specified**

Multi-Project Wafer (MPW) Runs of Full Custom Pitch Adapters

Wednesday, November 14, 2012 11:50 AM (20 minutes)

Since the fabrication of the full series of pitch adapters for the modules of the End-Cap part of the ATLAS Semiconductor Tracker (SCT), from 2003 to 2005, CNM-Barcelona has made several fabrications a year of pitch adaptors for different users. Our technology for pitch adapters is not a PCB-like technology, but a microelectronics technology with clean room fabrication. This is how we achieve the very high density (fine pitch), 0-defects, bonding quality, and high yield. The drawback of this technology is that the fabrication requires a minimum batch of at least 10 wafers, and it is very common that research institutes need a relatively small number of devices for prototyping experiments, therefore a minimum batch of 10 wafers gives them too many more devices than they really need. For this reason we have decided to launch an MPW program in which many users (designs) can share a single batch to reduce costs (as in the case of most microelectronic foundries in the world). In collaboration with Alibava Systems S.L. we can handle both the full custom design of the individual devices, plus the mounting of the full wafer design, and then the fabrication and individualization of the pieces for the different users.

We propose to the RD50 community to make MPW (Multi-Project Wafers) for pitch adapters, as it is usually made for ASICs, where many different users place their individual designs for PAs in a full wafer design to obtain smaller series (20, 50, or 120). We think that this could be a good service to the HEP community and, in particular, to the radiation detectors R&D community.

Primary authors: PELLEGRINI, Giulio (Universidad de Valencia (ES)); LOZANO FANTOBA, Manuel (Universidad de Valencia (ES)); Dr ULLAN COMES, Miguel (Universidad de Valencia (ES))

Presenter: Dr ULLAN COMES, Miguel (Universidad de Valencia (ES))

Session Classification: Radiation Damage in LHC detectors

Track Classification: Full Detector Systems

Contribution ID: 18

Type: **not specified**

Scribe-Cleave-Passivate (SCP) Slim Edge Technology for Silicon Sensors

Friday, November 16, 2012 9:20 AM (20 minutes)

Within the framework of RD50 and ATLAS PPS collaborations, we are pursuing scribe-cleave-passivate (SCP) technology of making “slim edge” sensors. Such sensors have only a minimal amount of inactive peripheral region, which benefits construction of large-area tracker and imaging systems. Key application steps of this method are surface scribing, cleaving, and passivation of the resulting sidewall. We are working on developing both the technology and understanding of the processed devices performance. Our recent advances with regard to the processing steps and device performance will be described. We will also report on the status of devices processed at the request of the RD50 collaborators.

Primary authors: Mr PARKER, Colin (UCSC); SADROZINSKI, Hartmut (SCIPP, UC santa Cruz); Dr CHRISTOPHERSEN, Marc (NRL); Mr JEFFREY, Ngo (UCSC); Dr BERNARD, Philips (NRL); FADEYEV, Vitaliy (University of California,Santa Cruz (US))

Presenter: FADEYEV, Vitaliy (University of California,Santa Cruz (US))

Session Classification: Irradiation Facilities, 3D and Pixel Detectors (joined with ATLAS PPS)

Track Classification: Full Detector Systems

Contribution ID: 19

Type: **not specified**

A Charge Collection Study with Dedicated RD50 Charge Multiplication Sensors

Thursday, November 15, 2012 5:15 PM (20 minutes)

We investigate the charge collection efficiency of specially designed charge multiplication silicon strip detectors produced by MICRON in Liverpool under the framework of the CERN RD50 collaboration. Sensors are tested before and after proton and neutron irradiation to fluences of $1e15$ and $5e15$ neq/cm². Charge multiplication structures on these devices include varying diffusion times and energies for the implantation process, different sensor thicknesses, and several different strip width and pitch geometries. The charge collection for the charge multiplication devices is compared to standard silicon strip sensors with no charge multiplication properties. Bulk and interstrip capacitance-voltage and current voltage measurements are also carried out.

Primary authors: BETANCOURT, Christopher (Freiburg University); JAKOBS, Karl (Albert-Ludwigs-Universitaet Freiburg (DE)); KUEHN, Susanne (Albert-Ludwigs-Universitaet Freiburg (DE)); PARZEFALL, Ulrich (Albert-Ludwigs-Universitaet Freiburg (DE))

Presenter: BETANCOURT, Christopher (Freiburg University)

Session Classification: Full Detector Systems

Track Classification: Full Detector Systems

Contribution ID: 20

Type: **not specified**

Characterization of thin high irradiated n-in-p planar pixel sensor

Friday, November 16, 2012 10:00 AM (20 minutes)

Silicon pixel modules employing n-in-p planar sensors with an active thickness ranging from 75 μm to 285 μm were assembled with both FE-I3 and FE-I4 ATLAS chips.

The thinned sensors are designed to avoid the signal degradation and ensure the radiation hardness even after high fluences, moreover the n-in-p technology requires a single side processing and is a cost-effective alternative to n-in-n sensors for larger radii of the silicon pixel tracker.

In this talk we present and compare results of the characterization of these pixel modules after high irradiation up to a fluence of $1\text{e}16 \text{ n_eq cm}^{-2}$.

High precision beam test measurements have been performed with high energy pions at the SpS CERN and compared to results from laboratory obtained using a radioactive Sr90 source.

Cluster proprieties, charge collection and tracking efficiency of the devices have been investigated.

Primary author: TERZO, Stefano (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D))

Presenter: TERZO, Stefano (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D))

Session Classification: Irradiation Facilities, 3D and Pixel Detectors (joined with ATLAS PPS)

Track Classification: Radiation Damage in LHC Detectors (Wednesday morning)

Contribution ID: 21

Type: **not specified**

Simulation of electric field profile in Si irradiated detectors with a consideration of carrier generation parameters

Thursday, November 15, 2012 12:30 PM (20 minutes)

Impact of the parameters which define bulk generation current of Si irradiated detectors on the detector characteristics is analyzed. The electric field profile and space charge/free carrier concentrations are simulated regarding generation current and carrier generation lifetime.

Primary author: Dr VERBITSKAYA, Elena (Ioffe Physical-Technical Institute of Russian Academy of Sciences)

Co-author: Dr EREMIN, Vladimir (Ioffe Physical-Technical Institute of Russian Academy of Sciences)

Presenter: Dr VERBITSKAYA, Elena (Ioffe Physical-Technical Institute of Russian Academy of Sciences)

Session Classification: Detector Characterization and Simulations

Track Classification: Simulations

Contribution ID: 22

Type: **not specified**

Radiation damage effects to the CMS Silicon Tracker

Wednesday, November 14, 2012 9:15 AM (25 minutes)

Studies of radiation damage to the sensors of the CMS Pixel and Strip Detectors during LHC running in 2011 and 2012 are presented. Leakage current and depletion voltage are monitored with increasing fluence. Methods for addressing the challenges of these measurements in the context of ongoing detector operations are discussed. These include the derivation of depletion voltage from hit efficiencies, the measurement of silicon temperature and extrapolation of current as a function thereof, and determination of the total fluence from LHC luminosity. The results allow for validation of existing radiation damage models of radiation damage and an improved understanding of the anticipated lifetime of the detectors.

Primary author: ZENZ, Seth (Princeton University (US))

Presenter: ZENZ, Seth (Princeton University (US))

Session Classification: Radiation Damage in LHC detectors

Track Classification: Radiation Damage in LHC Detectors (Wednesday morning)

Contribution ID: 23

Type: **not specified**

Progress on the Low Resistance Strip Sensors and Slim Edges Combined RD50 Experiment

Friday, November 16, 2012 9:40 AM (20 minutes)

An update will be presented on the Common RD50 Project “Low Resistance Strip Sensors”. Three RD50 institutes are collaborating in this project (CNM-Barcelona, IFIC-Valencia, and SCIPP-Santa Cruz), in which a new method to enhance the sensor hardness to beam-loss damage is studied. The fabrication has been combined with new experiments related with another RD50 Common Project involving Slim Edges.

Wafers for the Low Resistance Strip Sensors experiment have been fabricated, first technological measurements results will be shown.

Primary author: BENITEZ CASMA, Victor Hugo (Universidad de Valencia (ES))

Co-authors: Dr GRILLO, Alex (University of California,Santa Cruz (US)); SADROZINSKI, Hartmut (SCIPP, UC santa Cruz); Dr ULLAN COMES, Miguel (Universidad de Valencia (ES)); FADEYEV, Vitaliy (University of California,Santa Cruz (US))

Presenter: BENITEZ CASMA, Victor Hugo (Universidad de Valencia (ES))

Session Classification: Irradiation Facilities, 3D and Pixel Detectors (joined with ATLAS PPS)

Track Classification: Full Detector Systems

Contribution ID: 24

Type: **not specified**

Impact of proton irradiations on the electrical properties of n-type Si-diodes

Thursday, November 15, 2012 9:15 AM (15 minutes)

Silicon n-type diodes made of FZ and MCz material were manufactured for the CMS HPK campaign and irradiated with 23 MeV and 23 GeV protons. At a fluence of $3 \times 10^{14} / \text{cm}^2$ neq the MCz n-type diodes demonstrate clear type inversion after 23 MeV proton irradiation. This does not appear after the irradiation with 23 GeV protons. An influence of process induced bulk defects could be excluded.

In order to get a deeper understanding of the differences of the radiation induced defects, the Thermally Stimulated Current Technique (TSC) was used.

The sensors were electrically characterized by means of capacitance-voltage (C-V) and current-voltage (I-V) measurements. Transient current technique pulses (TCT) and charge collection efficiency (CCE) measurements have indicated a dependence of the bulk damage on the proton energy. Moreover a dependence on the oxygen concentration of the sensors could be observed.

Primary author: Ms NEUBÜSER, Coralie (University of Hamburg)

Co-authors: JUNKES, Alexandra (Brown University); ECKSTEIN, Doris (DESY); FRETWURST, Eckhart (II. Institut fuer Experimentalphysik); GARUTTI, Erika (DESY); Dr STEINBRUECK, Georg (Hamburg University (DE)); ERFLE, Joachim (Hamburg University (DE)); POEHLSEN, Thomas (University of Hamburg)

Presenter: Ms NEUBÜSER, Coralie (University of Hamburg)

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: 25

Type: **not specified**

RADIATION DEFECT TRANSFORMATIONS UNDER ANNEALING OF P-TYPE SILICON

Wednesday, November 14, 2012 2:40 PM (20 minutes)

Comparative studies of radiation defect annealing in p-type silicon diodes made by different producers have been performed. We have studied as pure silicon so silicon-germanium diodes. Radiation defects have been produced by irradiation with electrons and alpha-particles at different temperatures.

It has been found that under annealing at temperatures $>250\text{ }^{\circ}\text{C}$ the concentration of interstitial carbon-interstitial oxygen complex grows up to 50 % in diodes with the highest resistivity. Germanium doping influences annealing behavior of vacancy-type defects but not interstitial-type defects. Direct current injection essentially lowers annealing temperature not only for primary defects but for other secondary interstitial defects and some of their complexes also. Tentative explanations of these observations are presented.

Primary author: Dr MAKARENKO, Leonid (Belarusian state University)

Co-authors: KORSHUNOV, F.P. (Scientific-Practical Materials Research Centre of NAS of Belarus, Minsk, Belarus); MOLL, Michael (CERN); ABROSIMOV, N.V. (Leibniz Institute for Crystal Growth, Berlin, Germany); LASTOVSKI, S.B. (Scientific-Practical Materials Research Centre of NAS of Belarus, Minsk, Belarus)

Presenter: Dr MAKARENKO, Leonid (Belarusian state University)

Session Classification: Defect and Material Characterization

Track Classification: Microscopic Defects and Material Characterization

Contribution ID: 26

Type: **not specified**

Workshop opening

Wednesday, November 14, 2012 9:00 AM (15 minutes)

Presenters: MOLL, Michael (CERN); GIBSON, Stephen (CERN)

Session Classification: Radiation Damage in LHC detectors

Contribution ID: 27

Type: **not specified**

ATLAS Pixel Detector radiation damage monitoring with the High Voltage delivery system

Wednesday, November 14, 2012 9:40 AM (20 minutes)

The ATLAS Pixel Detector radiation damage monitoring system uses leakage currents in pixel modules measured with ATLAS Pixel High Voltage delivery system. We present leakage currents measured in 2011 and 2012 and their dependence on the ATLAS integrated luminosity ($\sim 24 \text{ fb}^{-1}$). We compare them with the theoretical model prediction. The status of the system is presented as well as the prospects for the further studies.

Primary authors: Dr GORELOV, Igor (University of New Mexico (US)); TOMS, Konstantin (University of New Mexico (US)); HOEFERKAMP, Martin (Department of Physics and Astronomy); WANG, Rui (University of New Mexico (US)); Prof. SEIDEL, Sally (University of New Mexico / ATLAS)

Presenter: WANG, Rui (University of New Mexico (US))

Session Classification: Radiation Damage in LHC detectors

Track Classification: Radiation Damage in LHC Detectors (Wednesday morning)

Contribution ID: 28

Type: **not specified**

Discussion Session: Materials and Defects

Wednesday, November 14, 2012 5:20 PM (30 minutes)

Presenter: MOLL, Michael (CERN)

Session Classification: Defect and Material Characterization

Contribution ID: 29

Type: **not specified**

Discussion on Detector Characterization and Simulations

Thursday, November 15, 2012 3:00 PM (30 minutes)

Presenters: FRETWURST, Eckhart (II. Institut fuer Experimentalphysik); EREMIN, Vladimir (Ioffe Physical Technical Institute of Russian Academy of Scienc)

Session Classification: Detector Characterization and Simulations

Contribution ID: 30

Type: **not specified**

Simulation of an effective 2-trap radiation damage model

Thursday, November 15, 2012 2:00 PM (20 minutes)

Simulations with an effective 2-trap radiation damage model have been performed. Adjustments of the EVL model and necessity of the adjustments are presented. In particular, the focus is on generated current after irradiation, depletion voltage and TCT simulation. Simulations are compared to IV, CV and TCT measurements done in the framework of the CMS HPK campaign.

Primary author: EBER, Robert (IEKP - KIT)

Presenter: EBER, Robert (IEKP - KIT)

Session Classification: Detector Characterization and Simulations

Track Classification: Simulations

Contribution ID: 31

Type: **not specified**

Annealing of Heavy Irradiated n-on-p Diodes at Temperatures 20°, 40°, 60° and 80°C

Thursday, November 15, 2012 11:10 AM (20 minutes)

N-on-p Micron diodes were irradiated with reactor neutrons to 1×10^{15} , 2×10^{15} and 1×10^{16} neq/cm². Diodes were submitted to graduated annealing steps at 20°, 40°, 60° and 80°C to verify previously accepted accelerating annealing factors. The evolution of leakage currents and full depletion voltage (FDV) were measured. The FDV was determined from Capacity-Voltage curves and Charge Collection –Voltage curves from infrared laser beam.

Primary author: MIKESTIKOVA, Marcela (Acad. of Sciences of the Czech Rep. (CZ))

Co-authors: STASTNY, Jan (Division Elementary Particle Phys.); Dr KODYS, Peter (Charles University); KOTEK, Zdenek (Institute of Physics)

Presenter: MIKESTIKOVA, Marcela (Acad. of Sciences of the Czech Rep. (CZ))

Session Classification: Detector Characterization and Simulations

Contribution ID: 32

Type: **not specified**

First investigation of silicon microstrips for the CMS tracker upgrade using edge-TCT

Thursday, November 15, 2012 9:40 AM (20 minutes)

First measurements of small strip detectors built within the HPK campaign of CMS and characterized using an edge-Transient Current Technique (eTCT) are presented. P and N bulk FZ 320 μm thick detectors are studied and compared to reference Micron detectors. A method to estimate the electric field profile inside the detector using normal incidence TCT and edge-TCT is also presented.

Primary author: FERNANDEZ GARCIA, Marcos (Universidad de Cantabria (ES))

Co-authors: NEUGEBAUER, Hannes (Hamburg University (DE)); GABRYSCH, Markus (CERN); MOLL, Michael (CERN); PACIFICO, Nicola (University of Bergen (NO))

Presenter: FERNANDEZ GARCIA, Marcos (Universidad de Cantabria (ES))

Session Classification: Detector Characterization and Simulations

Contribution ID: 33

Type: **not specified**

Punch through protection of heavily irradiated ATLAS07 mini-sensors.

Thursday, November 15, 2012 6:10 PM (20 minutes)

Protection of AC coupling capacitors from beam splashes has been studied on the heavy irradiated HPK ATLAS07 mini-sensors with special structures, BZ4A,B,C and D, for p-stop ion concentrations $2e12$, $4e12$ and $1e13$ ion/cm². Punch through voltage is rapidly increasing with neutron fluence from $4e14$ neq/cm² to $2e15$ neq/cm² for all tested ion concentrations and for $1E13$ ion/cm² it is significantly higher than 50V. Measurement prefers PT structure BZ4A and ion concentration $\sim 4E12$ ion/cm².

Primary author: Dr BOHM, Jan (Inst.of Physics AS CR)

Co-authors: SCHEIRICH, Jan (Charles University Prague); Dr SOLAR, Michael (Czech Technical University Prague); Dr KODYS, Peter (Charles University Prague); MASEK, Petr (Czech Technical University Prague); JINDRA, Tomas (Charles University Prague); Dr DOLEZAL, Zdenek (Charles University)

Presenter: Dr BOHM, Jan (Inst.of Physics AS CR)

Session Classification: Full Detector Systems

Track Classification: Full Detector Systems

Contribution ID: 34

Type: **not specified**

Silicon: survival of the fittest

Wednesday, November 14, 2012 1:30 PM (30 minutes)

By necessity, semiconductor silicon detectors are damaged by radiation during their use. Studies have been made since the beginning, in the fifties and sixties, and are continued until today. Understanding of the radiation effects helps to shape devices that can operate under quite harsh conditions. The extreme purity of industrial silicon allows predictability of performance and presents an advantage over other sensor materials.

Primary author: HEIJNE, Erik (Czech Technical University (CZ))

Presenter: HEIJNE, Erik (Czech Technical University (CZ))

Session Classification: 10 years of RD50

Contribution ID: 35

Type: **not specified**

Double Electric field Peak Simulation of Irradiated Detectors Using TCAD tools

Thursday, November 15, 2012 2:20 PM (20 minutes)

This work describes the simulation results performed within the RD50 simulation Group on the Double Electric Field Peak behaviour after radiation damage. As per the decision taken in the last RD50 meeting within the Simulation Group, the radiation damage is simulated by incorporating simple two deep level models in Silvaco and results are compared with modeled data. Since bulk generation current model is not available in the simulator so model parameters are modified, like the capture cross sections, introduction rates and carrier life time. For simplicity we have considered plane parallel silicon detectors, which allows to avoid any hardly predictable effects of the current and field focusing. Double peak structure start becoming visible for higher fluences under certain conditions and results imply that it is possible to implement the EVL model in TCAD simply by parametrization of the material parameters in simulation.

Primary author: BHARDWAJ, Ashutosh (University of Delhi (IN))

Co-authors: RANJAN, Kirti (University of Delhi (IN)); SHIVPURI, Ram Krishen (University of Delhi (IN)); DALAL, Ranjeet (University of Delhi)

Presenter: BHARDWAJ, Ashutosh (University of Delhi (IN))

Session Classification: Detector Characterization and Simulations

Track Classification: Simulations

Contribution ID: 36

Type: **not specified**

Charge Collection measurements of n-in-p strip detectors after mixed irradiation to HL-LHC fluences and annealing

Thursday, November 15, 2012 4:35 PM (20 minutes)

Planar n-in-p strip sensors produced by Hamamatsu Photonics were irradiated in consecutive irradiation steps with pions of 280 MeV/c, protons of 25 MeV/c and reactor neutrons resulting in a combined fluence of up to 2.8×10^{15} neq/cm².

The 320 μ m thick devices with p-stop interstrip isolation structures are investigated using electrons from a Sr90 source based on the ALIBAVA readout system. After each irradiation step both charge collection and noise measurements have been conducted. After irradiation to the highest dose consecutive annealing steps were at 60°C performed and again measurements with the beta source setup carried out.

Primary authors: DRIEWER, Adrian (Albert-Ludwigs-Universitaet Freiburg (DE)); KUEHN, Susanne (Albert-Ludwigs-Universitaet Freiburg (DE))

Co-authors: BETANCOURT, Christopher (Freiburg University); FORSHAW, Dean Charles (University of Liverpool-Unknown-Unknown); CASSE, Gianluigi (University of Liverpool (GB)); JAKOBS, Karl (Albert-Ludwigs-Universitaet Freiburg (DE)); DERVAN, Paul (University of Liverpool (GB)); HUSE, Torkjell (University of Liverpool (GB)); PARZEFALL, Ulrich (Albert-Ludwigs-Universitaet Freiburg (DE))

Presenter: KUEHN, Susanne (Albert-Ludwigs-Universitaet Freiburg (DE))

Session Classification: Full Detector Systems

Contribution ID: 37

Type: **not specified**

First experience with radiation-hard active sensors in 180 nm HV CMOS technology

Friday, November 16, 2012 11:10 AM (20 minutes)

We explore the concept of using a deep-submicron HV CMOS process to produce a drop-in replacement for traditional radiation-hard silicon sensors. Unlike fully integrated monolithic active pixel sensors (MAPS), such active sensors contain simple circuits, e.g. amplifiers and discriminators, but still require a traditional (pixel or strip) readout chip. This approach yields most of the advantages of MAPS (improved resolution, reduced cost and material budget, etc.), without the complication of full integration on a single chip.

After outlining the design of the HV2FEI4 test ASIC, characterization results, experience of standalone operation during CERN PS irradiations and first experience obtained with pixel and strip readout will be shown before discussing future prospects of active sensors.

Primary author: MUENSTERMANN, Daniel (CERN)

Presenter: MUENSTERMANN, Daniel (CERN)

Session Classification: Irradiation Facilities, 3D and Pixel Detectors (joined with ATLAS PPS)

Contribution ID: **38**

Type: **not specified**

Update on thin sensors results (will be shown on Friday afternoon in PPS meeting)

Thursday, November 15, 2012 4:20 PM (15 minutes)

Update on Si sensors from 100 micron.

Primary author: Dr CASSE, Gianluigi (Uniof Liverpool)

Presenter: Dr CASSE, Gianluigi (Uniof Liverpool)

Session Classification: Full Detector Systems

Contribution ID: 39

Type: **not specified**

Investigation of Charge Multiplication in Silicon Strip Sensors

Thursday, November 15, 2012 5:35 PM (15 minutes)

Dedicated sensors provided by RD50 were irradiated with neutrons or protons to $1e15\text{neq/cm}^2$ and $5e15\text{neq/cm}^2$. Charge collection, Signal to noise and leakage current of sensors with different pitch to width ratios have been measured as a function of annealing time and will be shown.

Primary authors: ALTAN, Lokman (KIT); EBER, Robert (KIT - Karlsruhe Institute of Technology (DE)); DE BOER, Wim (KIT - Karlsruhe Institute of Technology (DE))

Presenter: EBER, Robert (KIT - Karlsruhe Institute of Technology (DE))

Session Classification: Full Detector Systems

Contribution ID: 40

Type: **not specified**

Charge carrier detrapping in irradiated silicon sensors after microsecond laser pulses

Wednesday, November 14, 2012 4:10 PM (20 minutes)

An update on the detrapping time constants for charge carriers in irradiated silicon sensors using the TCT method with long (microsecond) laser pulses is given.

Primary author: GABRYSCH, Markus (CERN)

Co-authors: NEUGEBAUER, Hannes (Hamburg University (DE)); Prof. BRUZZI, Mara (Universita e INFN (IT)); FERNANDEZ GARCIA, Marcos (Universidad de Cantabria (ES)); MOLL, Michael (CERN); MORI, Riccardo (University of Florence, INFN)

Presenter: GABRYSCH, Markus (CERN)

Session Classification: Defect and Material Characterization

Contribution ID: 41

Type: **not specified**

Charge Trapping in the Simulation of ATLAS Semi-Conductor Tracker

Wednesday, November 14, 2012 10:00 AM (20 minutes)

One of the main, macroscopic radiation damage effects in silicon detectors is the charge trapping. It occurs when in the bulk of silicon sensors, exposed to intensive irradiation, defects acting as charge traps are induced. As a consequence, the charge collection efficiency of the detector is strongly affected.

The charge-trapping effect has been implemented in the simulation framework of the ATLAS Semi-Conductor Tracker.

The talk will present the general scheme used for this, together with some preliminary results regarding the detector response as a function of the fluence received.

Presenter: FILIPUZZI, Marco (Deutsches Elektronen-Synchrotron (DE))

Session Classification: Radiation Damage in LHC detectors

Contribution ID: 42

Type: **not specified**

Radiation damage effects in the LHCb Vertex Locator

Wednesday, November 14, 2012 10:20 AM (20 minutes)

The effects of radiation damage in the LHCb Vertex Locator have been studied with a variety of techniques, using both 2011 and 2012 data. An overview of these methods, which include bulk currents, the effective depletion voltage, the cluster finding efficiency and noise scans will be given. This will be followed by a summary of the key results using up to 2.7 inverse femtobarn of LHCb delivered luminosity.

Primary author: HARRISON, Jon (University of Manchester (GB))

Presenter: HARRISON, Jon (University of Manchester (GB))

Session Classification: Radiation Damage in LHC detectors

Contribution ID: 43

Type: **not specified**

CMS Preshower

Wednesday, November 14, 2012 11:10 AM (20 minutes)

Presenter: ELLIOTT-PEISERT, Anna (CERN)

Session Classification: Radiation Damage in LHC detectors

Contribution ID: 44

Type: **not specified**

Observation of type-inversion in the innermost tracking layer of the ATLAS Pixel Detector

Wednesday, November 14, 2012 11:30 AM (20 minutes)

Due to the increasing radiation dose accumulated by the ATLAS Pixel Detector at the LHC, the effects of radiation damage are now clearly observable. Macroscopic effects are induced from the creation of silicon crystal defects and key parameters such as leakage current and effective depletion voltage are routinely monitored. Measurements of the effective depletion voltage show a general trend of reduction due to the decrease of the effective n-doping concentration until the summer of 2012. More recent measurements exploiting a novel track based method reveal a subsequent rise in the effective depletion voltage, indicating type-inversion has occurred in the innermost layer of the Pixel Detector. The results are quantitatively compared with radiation damage models.

Presenters: SCHORLEMMER, Andre Lukas (CERN / Georg-August-Universitaet Goettingen (DE)); GIBSON, Stephen (CERN)

Session Classification: Radiation Damage in LHC detectors

Contribution ID: 45

Type: **not specified**

Simulation of Double Junction using Synopsys TCAD

Thursday, November 15, 2012 2:40 PM (20 minutes)

The Synopsys TCAD software package was used to perform a simulation of a simple p+-n-n+ diode containing two defects. The simulation parameters as described in the RD50 Simulation Working Group (V.Eremin) were used and the results of the simulation are compared to the data provided by V.Eremin.

Primary author: MOLL, Michael (CERN)

Co-authors: NEUGEBAUER, Hannes (Hamburg University (DE)); FERNANDEZ GARCIA, Marcos (Universidad de Cantabria (ES)); GABRYSCH, Markus (CERN)

Presenter: MOLL, Michael (CERN)

Session Classification: Detector Characterization and Simulations

Contribution ID: 46

Type: **not specified**

Discussion on Full Detector Systems

Thursday, November 15, 2012 6:30 PM (30 minutes)

Presenter: KRAMBERGER, Gregor (Jozef Stefan Institute (SI))

Session Classification: Full Detector Systems

Contribution ID: 47

Type: **not specified**

New proton irradiation facility in Ankara

Wednesday, November 14, 2012 5:10 PM (10 minutes)

Presenter: DEMIRKOZ, Bilge (Middle East Technical University (TR))

Session Classification: Defect and Material Characterization

Contribution ID: 48

Type: **not specified**

Bias effects in highly irradiated n+-p silicon microstrip detectors after long term annealing

Thursday, November 15, 2012 4:55 PM (20 minutes)

Effects of long term applied bias on charge collection properties in highly irradiated and annealed FZ n+-p silicon microstrip detectors were examined using the Alibava read-out system and Edge-TCT. A significant drop of both collected charge and the leakage current is observed after keeping the detectors under bias for longer periods of time (>1000 min). The time pattern is found to be fully repeatable under any bias or temperature and obviously seem to influence charge multiplication only. Applying sufficient bias voltage however (>1000 V), results in high enough SNR even after this fall to the stable level (after ca. 2000 min). Both CCE and the leakage current recover after keeping the detectors at room temperature and no bias for more than 24h.

Primary author: MILOVANOVIC, Marko (Jozef Stefan Institute, Ljubljana)

Co-authors: KRAMBERGER, Gregor (Jozef Stefan Institute (SI)); MANDIC, Igor (Jozef Stefan Institute (SI)); MIKUZ, Marko (Jozef Stefan Institute (SI)); Dr ZAVRTANIK, Marko (Jozef Stefan Institute (SI)); CINDRO, Vladimir (Jozef Stefan Institute (SI))

Presenter: MILOVANOVIC, Marko (Jozef Stefan Institute, Ljubljana)

Session Classification: Full Detector Systems

Contribution ID: 49

Type: **not specified**

RD50 - New structures discussion session

Friday, November 16, 2012 12:10 PM (30 minutes)

Presenter: PELLEGRINI, Giulio (Universidad de Valencia (ES))

Session Classification: Irradiation Facilities, 3D and Pixel Detectors (joined with ATLAS PPS)

Contribution ID: 50

Type: **not specified**

Measurements on 800 MeV proton irradiated diodes (moved from Wednesday!)

Thursday, November 15, 2012 9:30 AM (10 minutes)

Presenter: JUNKES, Alexandra (Brown University)

Session Classification: Detector Characterization and Simulations

Contribution ID: 51

Type: **not specified**

Study of the behaviours of silicon sensor structures, before and after irradiation

Friday, November 16, 2012 11:30 AM (20 minutes)

Presenter: UNNO, Yoshinobu (High Energy Accelerator Research Organization (JP))

Session Classification: Irradiation Facilities, 3D and Pixel Detectors (joined with ATLAS PPS)